

with reference to FIGS. 1 to 4. Referring to FIG. 1, when the second housing 20 is closed to the first housing 10, the second hinge axis A2 is parallel to the third hinge axis A3, while the second and third hinge axes A2 and A3 are perpendicular to the first hinge axis A1. Referring to FIG. 2, when the second housing 20 is fully opened from the first housing 10, the third hinge axis A3 is tilted to the third hinge axis A3. Referring to FIG. 3, when the second housing 20 is opened at 90° from the first housing 10, the second hinge axis A2 is perpendicular to the third hinge axis A3, apart from each other, and also perpendicular to the first hinge axis A1. When the mobile phone is placed in the state illustrated in FIG. 4, the first, second, and third hinge axes A1, A2, and A3 are in the same relationship as illustrated in FIG. 1.

[0044] Hereinbelow, the structures of the first and second housings 10 and 20, the hinge housing 30, and the camera lens housing 40 will be described in more detail.

[0045] Referring to FIGS. 2 and 5, the first housing 10 has a key array 11 with a plurality of keys and a nearby microphone 12 on its top surface 10a. A battery pack 14 is detachably installed on the bottom surface 10b of the first housing 10.

[0046] Referring to FIGS. 2 and 4, the second housing 20 has an auxiliary display 23 on its top surface 20a and a main display 22 on its bottom surface 20b. A speaker 21 is positioned near the main display 22. An auxiliary frame 25 is interposed between the second housing 20 and the hinge housing 30. The second housing 20 is connected to the auxiliary frame 25 rotatably around the second hinge axis A2. The auxiliary frame 25 extends in the direction of the first hinge axis A1.

[0047] Referring to FIGS. 1 and 4, the hinge housing 30 comprises a pair of side hinge arms 31 and 32 integrally connected to the first housing 10, a center hinge arm 33 integrally connected to the second housing 20, specifically the auxiliary frame 25 between the side hinge arms 31 and 32, and a camera lens hinge arm 34 at one side of the side hinge arm 31, for containing the camera lens housing 40 therein. A hinge module (not shown) is installed in the center hinge arm 33 and the auxiliary frame 25 to enable the second housing 20 to rotate around the first and second hinge axes A1 and A2. By rotating around the first and second hinge axes A1 and A2, the second housing 20 can be brought into close contact with the first housing 10 with the main display 22 exposed, as is illustrated in FIG. 6.

[0048] The camera lens hinge arm 34 has the exposurer for exposing a camera lens (41 in FIG. 7) in the camera lens housing 40. The exposurer is comprised of first, second, and third openings 35, 36, and 37 formed in the camera lens hinge arm 34. The first opening 35 is formed on a side surface 34a of the camera lens hinge arm 34 along the first hinge axis A1. The second opening 36 is formed on a surface of the camera lens hinge arm 34 facing a user when the second housing 20 is closed to the first housing 10 as illustrated in FIG. 1. The third opening 37 is formed in a position opposite to the second opening 36 with respect to the third hinge axis A3. The second and third openings 36 and 37 are on the outer surface of the camera lens hinge arm 34.

[0049] The first opening 35 is larger in diameter than the second and third openings 36 and 37. The second and third

openings 36 and 37 of the same shape are apart from each other, symmetrically with respect to the third hinge axis A3.

[0050] The camera lens housing 40 may be cylindrical, though it is shown as spherical. The camera lens housing 40 is installed to be rotatable with respect to the third hinge axis A3, having the camera lens 41 exposed from its outer circumferential surface. The outer circumferential surface of the camera lens housing 40 is partially exposed from the first opening 35 and the camera lens 41 can be positioned in any of the first, second, and third openings 35, 36, and 37.

[0051] Preferably, the camera lens housing 40 rotates around the third hinge axis A3 within a predetermined first angle. The first angle can be 180° or less. It is shown as 180°. However, if the second and third openings 36 and 37 are formed in different positions, the first angle may be changed.

[0052] The structure of an angle controller 50 for manually controlling the camera lens housing 40 will be described below with reference to FIG. 7. In FIG. 7, the angle controller 50 is formed at an edge 10c of the bottom surface of the first housing 10, particularly, near the camera lens hinge arm 34.

[0053] The angle controller 50 includes a teeth gear 51 partially protruding from a through hole formed at the edge 10c of the bottom surface of the first housing 10, and one or more gears 42 and 52 for transferring the rotational force of the teeth gear 51 to the camera lens housing 40. The teeth gear 51 rotates with respect to a fourth hinge axis A4 by a user's manual manipulation. The third hinge axis A3 and the fourth hinge axis A4 are parallel to each other.

[0054] Part of the teeth gear 51 protrudes outward, while its remaining part is held in the first housing 10. The second gear 52 is at an end of a rotational shaft S1 of the teeth gear 51. In the camera lens housing 40, a rotational shaft S2 is extended along the third hinge axis A3 and the third gear 42 is on the rotational shaft S2. The second gear 52 is engaged with the third gear 42. As the teeth gear 51 rotates, the second gear 52 rotates. Simultaneously, the third gear 42 rotates, which in turn rotates the camera lens housing 40. The rotation of the camera lens housing 40 displaces the camera lens 41 coaxially with a selected one of the first, second, and third openings 35, 36, and 37. At the position, the camera lens 41 captures an object.

[0055] A CCD (Charged Coupled Device; not shown) is installed in the camera lens housing 40 and connected to a main board (not shown) of the first housing 10 by an FPCB (Flexible Printed Circuit Board). The FPCB is directed to the first housing 10 via a through opening 38 and the side hinge arm 32.

[0056] Referring to FIGS. 8 to 12, a mobile phone 100 according to another embodiment of the present invention includes a first housing 101, a second housing 102, which is connected to the first housing 101 in such a manner that it can be rotated in a receding direction from the first housing 101 or turned crosswise to the first housing 101, and a camera lens assembly 200 at a portion of the mobile phone 100. The camera lens assembly 200 comprises a rotational camera lens housing 202 in FIG. 13, a camera lens hinge arm 201 at a portion, specifically, at an upper portion of the mobile phone 100, for holding the camera lens housing 202 therein, and exposurers 235, 213, and 217 defined on the camera lens hinge arm 201, for exposing the camera lens